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CHECKLIST

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# An annotated checklist of Coccinellidae with four new records from Pakistan (Coleoptera, Coccinellidae)

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## Abstract

Some new ladybird (Coleoptera: Coccinellidae) records collected during the last four years across Sindh are reported. A first preliminary checklist of ladybirds from Sindh is presented, consisting of one subfamily, ten tribes, 21 genera, and 29 species including four new records, namely *Bulaea lichatschovii* (Hummel), *Exochomus pubescens* Küster, *Scymnus* (*Pullus*) *latemaculatus* Motschulsky, *Scymnus* (*Pullus*) *syriacus* Marseul, and four varieties of the species *Cheilomenes sexmaculatus* (Fabricius).

## Keywords

aphid, Chilocorinae, Coccidulinae, Coccinellinae, mealybug, predatory, Coccinellinae, Scymninae

## Introduction

According to the most recent classification, the family Coccinellidae comprises two subfamilies: Microweiseinae Leng, 1920 and Coccinellinae Latreille, 1807 (sensu Slipinski 2007) based on phylogenetic results (Seago et al. 2011). These changes impact the status of various traditionally recognized tribes and subfamilies, as the onlysub-

families now recognized are Microweiseinae and Coccinellinae (Canepari et al. 2016). Microweiseinae comprises three tribes: Carinodulini, Microweiseini, and Serangiini whereas Coccinellinae consists of only two tribes: Coccinellini and Chilocorini (Robertson et al. 2015)

Worldwide, nearly 6000 species spanning nearly 360 genera are known. Approximately 90 % of the species are predators of aphids, coccids, psyllids, aleyrodids, chrysomelid larvae, and mites, the remainder being herbivorous or mycetophagous (Inayatullah 1984, Majerus 1994, Obrycki and Kring 1998, Iperti and Bertand 2001, Vandenberg 2002, Hodek 2012).The Coccinellidae are an important group of beetles from both an economic standpoint in their use as biological control agents and in their diversity and adaptation to a number of differing habitats (Michels 1987).

From Pakistan, Ahmad and Ghani (1966, 1968, 1970, 1973), Inayatullah and Siddiqui (1978, 1979, 1980), and Ali et al. (2012) worked on different species of the family Coccinellidae; Iablokoff-Khnzorian (1986) described a new species *Adalia puetzi* from Pakistan; Hashmi and Tashfeen (1992) studied the coccinellids housed in different institutions of Pakistan and reported 162 species, identifying the coccinellids deposited in the Natural History Museum, London, but with wrong synonymies. The present authors tried to trace this valuable collection of coccinellids in the present institutions in Karachi and other cities of Pakistan but found very few coccinellids. The authors also tried to correct the wrong synonymies and wrong identifications mentioned in the above-mentioned paper with the help of checklists and taxonomic papers available. Irshad (2001) listed 71 species of coccinellids in Pakistan; Rafi et al. (2005) gave a brief external morphology of predatory coccinellids of northern parts of Pakistan with special reference to their hosts, prey and localities, and listed 37 genera and 75 species belonging to different tribes of subfamilies Chilocorinae, Coccidulinae, Coccinellinae, Scymninae, and Sticholotidinae. All listed species are very common in Pakistan and represent a much less complete inventory than that of Hashmi and Tashfeen (1992). Otherwise, the description of genitalia was totally absent. Ali et al. (2012, 2013, 2014, 2015) conducted a systematic study from Sindh Province for the first time. They listed 29 coccinellids with four new records and four varieties of *Cheilomenes sexmaculatus*.

According to Ghouri 1960, Kazmi 1980, Hashmi et al. (1983), Ali and Munir 1984, Ghani 1985, Inayatullah 1984, Mohyuddin and Mahmood 1993, Buriro 1996, Jan et al. 2003, Aslam et al. 2004, Abbas et al. 2007, Solangi et al. 2007, Massod et al. 2008, Rafiq et al. 2008, Arif et al. 2009, Mari and Lohar 2010, Iqbal et al. 2008, Iqbal et al. 2011, and Masood 2011, the following viz., *Schizaphis graminum* (Rondani), *Sitobion avenae* (Fabricius), *Aphis gossypii* Glover, *Aphis fabae* Scopoli, *Aphis nerii* Boyer de Fonscolombe, *Aphis craccivora* (Koch) *Rhopalosiphum maidis* (Fitch), *Therioaphis trifolii* (Monell), *Hysteroneura setariae* (Thomas), *Lipaphis erysimi* (Kaltenbach), *Brevicoryne brassicae* (Linnaeus), *Myzus persicae* (Sulzer), and *Hyadaphis coriandri* (Das) (Homoptera: Aphididae); *Amritodus atkinsoni* (Lethierry)), *Amrasca biguttula biguttula* (Ishida), *Empoasca lybica* (Bergevin and Zanon) (Homoptera: Cicadellidae); *Bemisia tabaci* (Gennadius), *Aleurolobus barodensis* (Maskell), *Dialeurodes citri*

(Ashmead) and *Aleurocanthus husaini* Corbett (Homoptera: Aleyrodidae); *Brevipalpus lewisi* McGregor (Acarina: Tenuipalpidae), *Eutetranychus orientalis* (Klein), and *Tetranychus atlanticus* McG. (Acarina: Tetranychidae) are common pests of wheat, cotton, sugarcane, mango, mustard, vegetables, and fruits in Pakistan. Other works related with the taxonomy, morphology, diversity, distribution and ecology of different coccinellids include Rahman (1940), Ahmad (1969), Irshad (2001b), Khan et al. (2006), Rahatullah et al. (2010, 2011, 2012); Ali et al. (2012); Abbas et al. (2013), and Ashfaque et al. (2013). Ali (2012, 2013, 2014, 2015) was the first to report 29 coccinellid species from Sindh with a brief study on the taxonomy of the family Coccinellidae and their role in the field of biological control of important agricultural crop pests such as aphids, mealybugs, scale insects, jassids, and whiteflies.

The coccinellid fauna of Sindh, Pakistan is insufficiently known, and no checklist exists. The goal of this paper is to contribute to the knowledge of diversity and distribution of ladybirds in Sindh as well as to present the first preliminary checklist of the species recorded previously in the territory of Sindh.

## Materials and methods

Ladybird records presented in this paper were collected, identified, and confirmed during the last four years by the authors following the checklists, descriptions, and keys given by Chapin and Ahmad (1966), Pang and Gordon (1986), Poorani (2004), and Rafi et al. (2005), and with the help of the following website: NBAIR (2009). Ladybirds were also identified and confirmed by Dr. Claudio Canepari (Societa Entomologica Italiana), an authority on the family Coccinellidae. Specimens were collected during field trips conducted in different parts of Sindh Province, and in reality represent random findings instead of systematic collecting. Beetles were collected in standard ways, including manual collecting, net sweeping, and using light traps. The terminologies for various taxonomic structures including genitalia and procedures used by Inayatullah and Siddiqui (1978) and Gordon (1985) were generally followed. The taxonomic structures, especially male and female genitalia, were preserved after illustration in microvials with glycerine and pinned with specimens.

## Results

The coccinellids present in this checklist are classified on the basis of the new classification given by Seago et al. 2011, Robertson et al. 2015, and Canepari 2016. According to this classification all the coccinellids of the Sindh Province belong to the subfamily Coccinellinae only. It includes nine species of the tribe Coccinellini, one species of the Psylloborini, one species of the tribe Bulaeini, five species of the Chilocorini, one species of the Tribe Noviini Mulsant, one species from Tribe Hyperaspini, one species from the

Tribe Stethorini, six species of Scymnini, one species of the Tribe Shirozuellini, and three species of the Tribe Sticholotidini. New records are *Bulaea lichatschovii* (Hummel), *Exochomus pubescens* Küster, *Scymnus* (*Pullus*) *latemaculatus* Motschulsky, *Scymnus* (*Pullus*) *syriacus* Marseul with four varieties of *Cheilomenes sexmaculatus* (Fabricius).

## Subfamily Coccinellinae Latreille, 1807
## Tribe Coccinellini Latreille, 1807
## *Coccinella* Linnaeus, 1758

### *Coccinella septempunctata* Linnaeus, 1758

Fig. 1

**General distribution.** India, Nepal, Sri Lanka, Pakistan, Palaearctic. North America (Poorani 2002).

**Distribution in Sindh.** Tandojam, Larkana, Mirpur Khas, Thatta, Karachi (Sarwar 2009, Mahmood et al. 2011, Ali 2013, Fazal Ellahi et al. 2017).

**Host plants and prey species in Sindh.** *Brevicoryne brassicae* (L), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura setariae* (Thomas), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera); *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant, okra, wheat, cotton, sugarcane, and rose plants (Ali 2013).

### *Coccinella undecimpunctata* Linnaeus, 1758

Fig. 2

**General distribution.** India, Pakistan. Palaearctic (Poorani 2002).

**Distribution in Sindh.** Karachi, Hyderabad, Tandojam, Mirpur Khas and Thatta (Sarwar 2009, Mahmood et al. 2011, Ali 2013, Fazal Ellahi et al. 2017).

**Host plants and prey species in Sindh.** *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera); *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, brinjal, okra, wheat, cotton, sugarcane, and rose plants (Ali 2013).

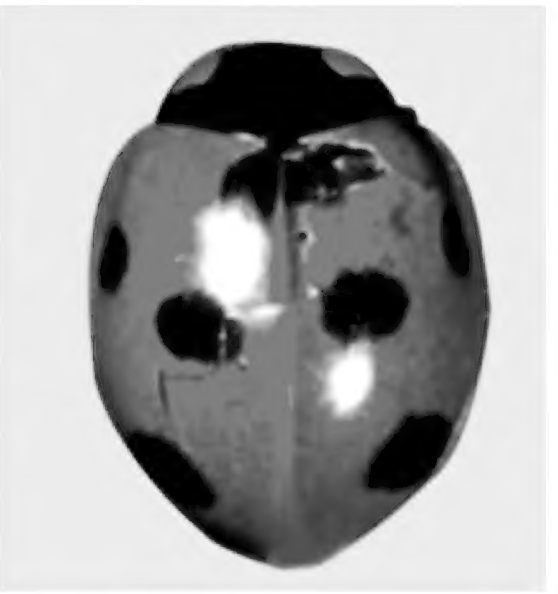

**Figure 1.** *Coccinella septempunctata* Linnaeus.

**Figure 2.** *Coccinella undecimpunctata* Linnaeus.

### *Coccinella transversalis* Fabricius, 1781

Fig. 3

**General distribution.** India, Nepal, Sri Lanka, Bangladesh, Indochina, Indonesia, Japan, Australia, New Zealand (Poorani 2002).

**Distribution in Sindh.** Hyderabad, Larkana, Mirpur Khas, and Thatta (Ali 2013).

**Host plants and prey species in Sindh.** *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera); *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, brinjal, okra, wheat, cotton, sugarcane, and rose plants (Ali 2013).

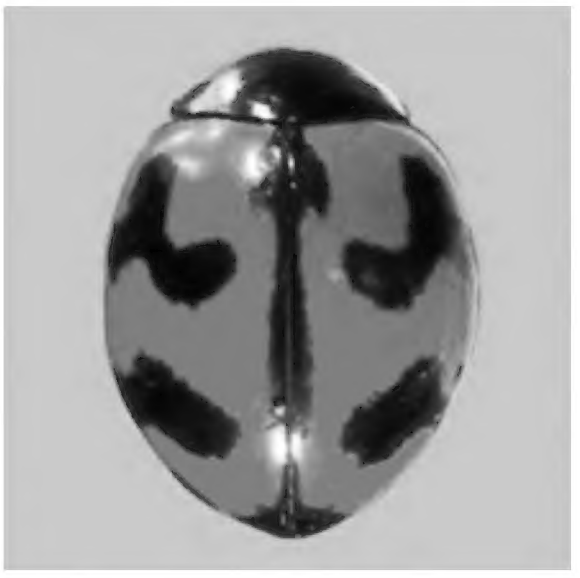

**Figure 3.** *Coccinella transversalis* Fabricius.

## *Cheilomenes* Dejean, 1836

### *Cheilomenes sexmaculata* (Fabricius, 1781)

Fig. 4

**General distribution.** India, Bangladesh, Pakistan, Sri Lanka, Bhutan, Myanmar. Malaysia, Indonesia, Philippines, Vietnam, China, Japan, Australia (Poorani 2002).

**Distribution in Sindh.** Hyderabad, Larkana, Mirpur Khas, and Thatta (Sarwar 2009, Mahmood et al. 2011, Ali 2013, Balouchi and Swati 2014, Fazal Ellahi et al. 2017).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Schizaphis graminum* (Rondani), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll), *Centrococcus insolitus* Green (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera) *Aleurocanthus husaini* Corbett, *Aleurocanthus woglumi* Ashby, *Aleurolobus barodensis* Mask *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida), *Amritodus atkinsoni* Leth, *Evacanthus repexus* Dist (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera), *Pyrilla perpusilla* Walk (Fulgoridae: Homoptera), *Quadraspidiotus perniciosus* Comst (Diaspididae: Homoptera), *Diaphorina citri* Kuw (Psyllidae: Homoptera), *Tetranychus orientalis* Mog (Acarina: Tetranychidae) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant, okra, wheat, cotton, and rose plants (Ali 2013).

**Comment.** Common. It is very difficult to compare this species with other taxa because of polymorphism. Six varieties of this species are reported from Pakistan.

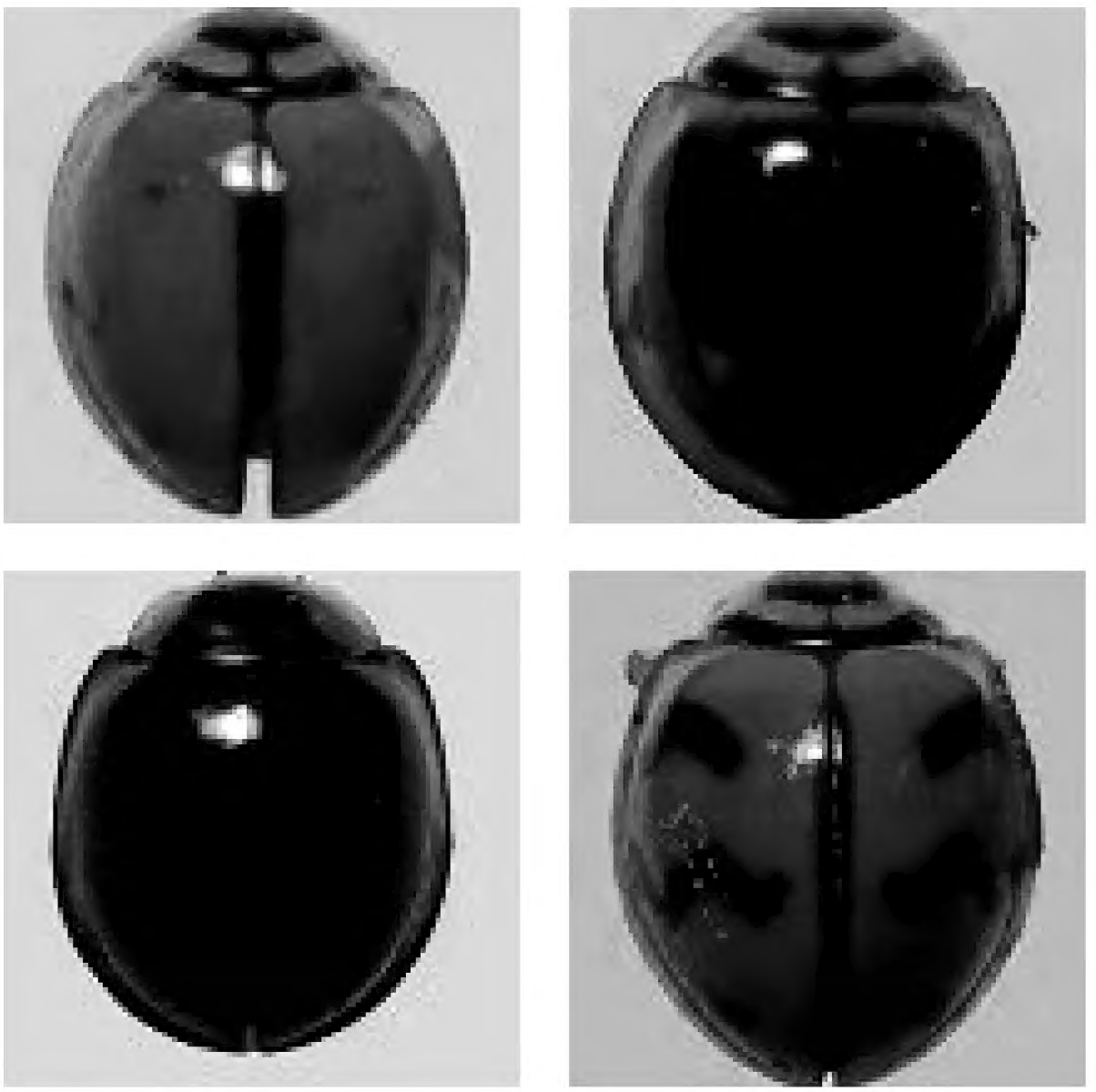

**Figure 4.** *Cheilomenes sexmaculata* (Fabricius).

***Hippodamia variegata* (Goeze, 1777)**
Fig. 5

**General distribution.** Nepal, Pakistan, Afghanistan, Tibet, Mongolia, China, northern and eastern Africa, Palaearctic (Poorani 2002).

**Distribution in Sindh.** Hyderabad, Karachi, and Thatta (Lohar et al. 2012, Ali 2013).

**Host plants and prey species in Sindh.** *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera); *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, brinjal, okra, wheat, cotton, and rose plants (Ali 2013).

**Figure 5.** *Hippodamia variegata* (Goeze).

### *Micraspis allardi* (Mulsant, 1866)

Fig. 6

**General distribution.** India, Nepal, Pakistan, Myanmar, Indonesia (Poorani 2002).

**Distribution in Sindh.** Hyderabad, Mirpur Khas, Thatta and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Amritodus atkinsoni* Teth (Cicadellidae: Homoptera) *Quadraspidiotus perniciosus* Comst (Diaspididae: Homoptera), *Pyrilla perpusilla* Walk (Fulgoridae: Homoptera) (Ali 2013).

### *Oenopia sauzeti* Mulsant, 1866

Fig. 7

**General distribution.** India, Bhutan, Pakistan, Nepal, Myanmar, Thailand, China (Poorani 2002).

**Distribution in Sindh.** Hyderabad, Mirpur Khas, Thatta, and Karachi (Ali 2013).

**Host plants and Prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Schizaphis graminum* (Rondani), *Ropalosiphum maidis* (Fitch) (Aphididae: Homoptera), *Aleurolobus barodensis* Mask *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida), *Evacanthus repexus* Dist (Cicadellidae: Homoptera), *Tetranychus* sp. (Acarina: Tetranychidae) on wheat, mustard, and cabbage (Ali 2013).

### *Propylea quatuordecimpunctata* (Linnaeus, 1758)

Fig. 8

**General distribution.** India, Pakistan, Bangladesh, Japan, China, Europe, North America (Poorani 2002).

**Figure 6.** *Micraspis allardi* (Mulsant).

**Figure 7.** *Oenopia mimica* Weise.

**Figure 8.** *Propylea quatuordecimpunctata* (Linnaeus).

**Distribution in Sindh.** Hyderabad and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis*

*gossypii* (Glover), *Hyadaphis coriandri* (Das) (Aphididae: Homoptera), *Aleurolobus barodensis* Mask *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida), *Evacanthus repexus* Dist (Cicadellidae: Homoptera) (Ali 2013).

### *Harmonia dimidiata* (Fabricius, 1781)

Fig. 9

**General distribution.** India, Pakistan, Nepal, Bhutan, China, Japan, Taiwan, introduced into North America (Poorani 2002).

**Distribution in Sindh.** Hyderabad and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae*(L), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Hyadaphis coriandri* (Das), *Hysteroneura setariae* (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kirby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera), *Amritodus atkinsoni* Leth, *Idioscopus nagpurensis* Pruthi (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) ( Aleyrodidae: Homoptera), *Tetranychus atlanticus* Mog (Acarina: Tetranychidae), *Adelges* spp. (Adelgidae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant, okra, wheat, cotton, and rose plants (Ali 2013).

## Tribe Bulaeini Savoiskaja, 1969

### *Bulaea lichatschovii* (Hummel, 1827)

Fig. 10

**General distribution.** Pakistan, India, Central and West Asia, Afghanistan, Mediterranean region. North and Central Africa (Poorani 2002, Ali 2013).

**Distribution in Sindh.** Hyderabad and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Myzus persicae* (Sulzer), *Diaphorina citri* Kuw (Psyllidae: Homoptera) on wheat and mustard.

**Comments.** Newly recorded from Pakistan.

## Tribe Psylloborini Casey, 1899

### *Psyllobora bisoctonotata* (Mulsant, 1850)

Fig. 11

**General distribution.** India and Pakistan (Poorani 2002).

**Distribution in Sindh.** Hyderabad and Karachi (Ali 2013).

**Prey in Sindh.** All the members of this genus are mycophagous (Ali 2013).

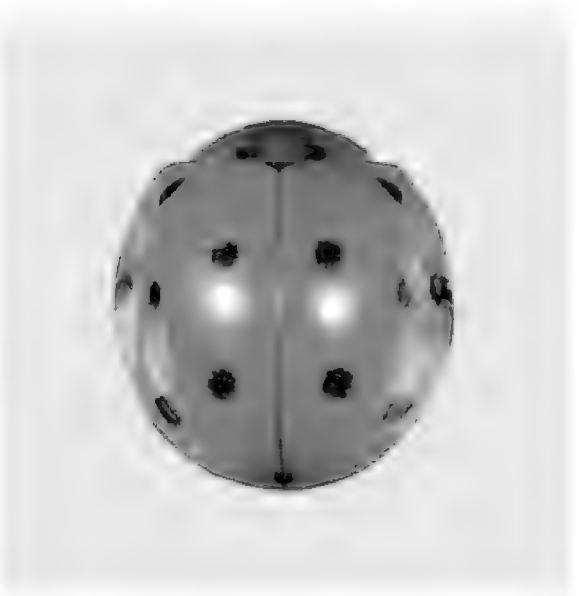

**Figure 9.** *Harmonia dimidiata* (Fabricius).

**Figure 10.** *Bulaea lichatschovii* (Hummel).

**Figure 11.** *Psyllobora bisoctonotata* (Mulsant).

## Tribe Chilocorini Costa, 1849
## *Chilocorus* Leach, 1815b

### *Chilocorus nigrita* (Fabricius, 1798)
Fig. 12

**General distribution.** Agalega, American Samoa, Burma, Brazil, Ghana, Guam, Hawaii, India, Indonesia, Kenya, Madagascar, Malaysia, Marshall Islands, New Caledonia, Nepal, Oman, Pakistan, Reunion Island, Seychelles, Solomon Islands, South Africa, Swaziland, Society Islands, Tanzania, Togo, Turkey and Zimbabwe (Nandwani and Joseph 2003, NBAII 2011, Omkar and Pervez 2003, Poorani 2002, Thomas and Blanchard 2014).

**Distribution in Sindh.** Tandojam, Hyderabad and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aonidiella auranti* (Mask), *A. citrina* (Coq), *A. orientalis* Newst, *Aspidiotus destructor* Sign, *Hemiberiesia latanias* (Sign), *Leucaspis coniferarum* Hall & Williams, *Parlatoria* spp, *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera) (Ali 2013).

### *Exochomus* (*Parexochomus*) *nigripennis* Erichson, 1843
Fig. 13

**General distribution.** northwestern India, Pakistan, Palaearctic, Africa (Poorani 2002).

**Distribution in Sindh.** Tandojam, Mirpur Khas, Hyderabad, and Karachi (Ali, 2013).

**Host plants and prey species in Sindh.** *Aphis fabae* Theobald, *Rhopalosiphum maidis* Fitch (Aphididae: Homoptera), *Parlatoria* spp. (Diaspididae: Homoptera), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera). It was recorded on trees and wild plants (Ali 2013).

### *Exochomus pubescens* Küster, 1848
Fig. 14

**General distribution.** Pakistan, India, Spain, North Africa, Greece, Egypt, Syria, Palestine (Poorani 2002).

**Distribution in Sindh.** Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Parlatoria* spp. (Diaspididae: Homoptera). It was found on oak (Ali 2013).

**Comment.** Newly recorded from Pakistan.

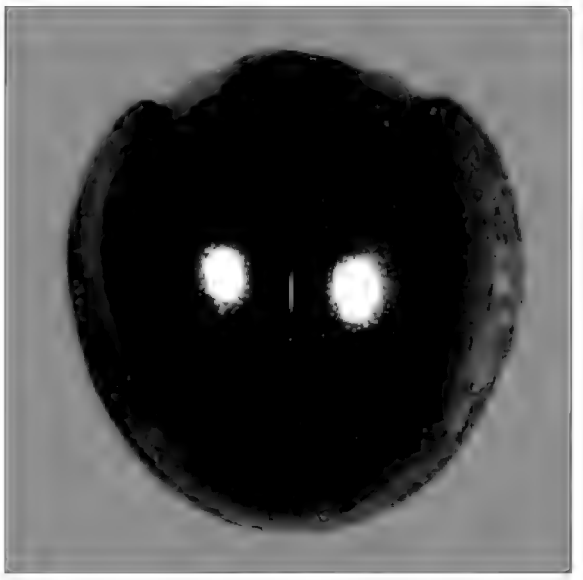

**Figure 12.** *Chilocorus nigrita* (Fabricius).

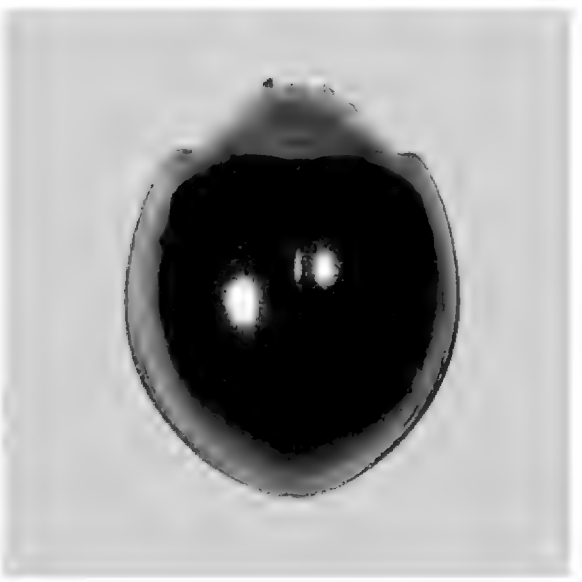

**Figure 13.** *Exochomus nigripennis* (Erichson).

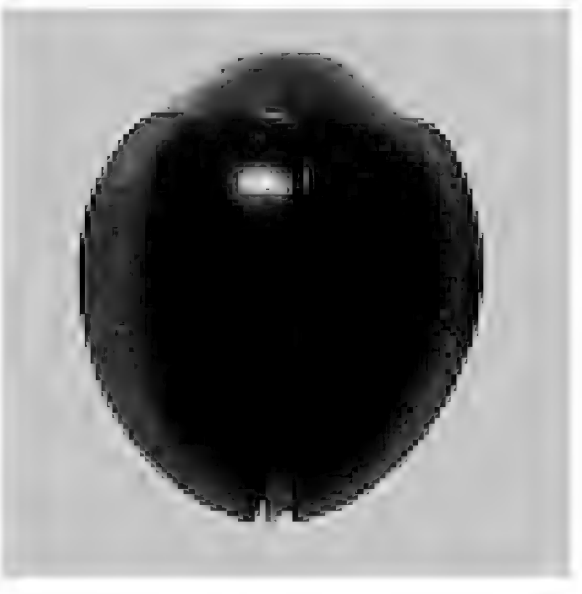

**Figure 14.** *Exochomus pubescens* Küster.

### *Priscibrumus uropygialis* (Mulsant, 1853)

Fig. 15

**General distribution.** India, Bhutan, Pakistan, Nepal (Poorani 2002).

**Distribution in Sindh.** Tandojam and Hyderabad (Ali 2013).

**Host plants and prey species in Sindh.** *Parlatoria* spp., *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera) on wild trees, and shrubs (Ali 2103).

### *Brumoides suturalis* (Fabricius, 1798)

Fig. 16

**General distribution.** India, Pakistan, Bangladesh, Sri Lanka, Bhutan, Nepal (Poorani 2002).

**Distribution in Sindh.** Tandojam, Mirpur Khas, Hyderabad, and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Hyadaphis coriandri* (Das), *Hysteroneura setariae* (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera), *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) ( Aleyrodidae: Homoptera), *Tetranychus atlanticus* Mog (Acarina: Tetranychidae), *Adelges joshii* S.O & S (Adelgidae: Homoptera), *Aonidiella auranti* (Mask), *A. citrina* (Coq), *A. orientalis* Newst, *Aspidiotus destructor* Sign, *Hemiberiesia latanias* (Sign), *Leucaspis coniferarum* Hall & Williams, *Parlatoria* spp, *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant, okra, wheat, cotton, and rose plants (Ali 2013).

## Tribe Noviini Mulsant, 1850, Genus *Rodolia* Mulsant, 1850

### *Rodolia ruficollis* Mulsant, 1850

Fig. 17

**General distribution.** India, Pakistan, Thailand (Poorani 2002).

**Distribution in Sindh.** Karachi and Mirpur Khas (Ali 2013).

**Host plants and prey species in Sindh.** *Icerya aegyptiaca* (Dougl) (Margarodidae: Homoptera). It was found on cotton and roses (Ali 2013).

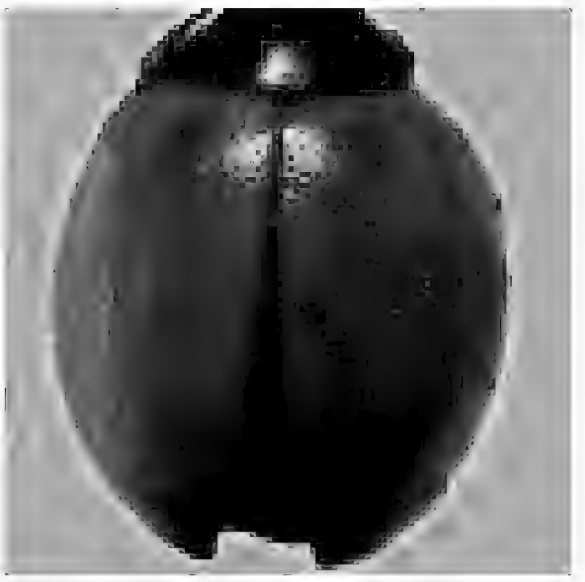

**Figure 15.** *Priscibrumus uropygialis* (Mulsant).

**Figure 16.** *Brumoides suturalis* (Fabricius).

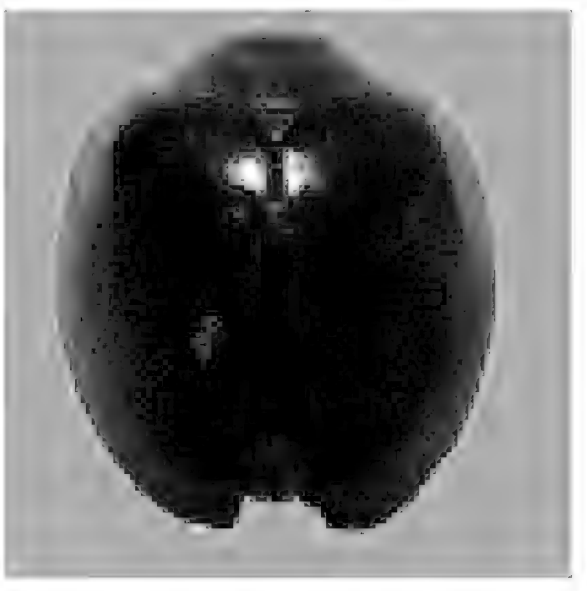

**Figure 17.** *Rodolia ruficollis* Mulsant.

### Tribe Hyperaspini Costa, 1849, Genus *Hyperaspis* Chevrolat, 1836

#### *Hyperaspis maindroni* Sicard, 1929

Fig. 18

**General distribution.** Pakistan and India (Poorani 2002).

**Distribution in Sindh.** Tandojam, Mirpur Khas, and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Centrococcus insolitus* (Green), *Naiacoccus* sp, *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera). It was found on cotton, okra, and trees (Ali 2013).

### Tribe Stethorini Dobzhansky, 1924, Genus *Stethorus* Weise, 1885b

#### *Stethorus gilvifrons* (Mulsant, 1850)

Fig. 19

**General distribution.** India, Pakistan, Italy, Cyprus (Poorani 2002).

**Distribution in Sindh.** Tandojam, Hyderabad, Mirpur Khas and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Brevipalpus* sp. (Tenuipalpidae: Acarina), *Eutetranychus cernus* (B&P), *E. orientalis* (Klein), *Tetranychus atlanticus* Mog (Acarina: Tetranychidae). It was collected from eggplant, okra, and some wild plants (Ali 2013).

### Tribe Scymnini Mulsant, 1846, Genus *Scymnus*, Mulsant, 1850

#### *Scymnus* (*Scymnus*) *nubilus* Mulsant, 1850

Fig. 20

**General distribution.** Pakistan, India, Bangladesh, Sri Lanka, Nepal, Myanmar, China, Asia Minor (Poorani 2002).

**Distribution in Sindh.** Tandojam, Mirpur Khas, Hyderabad, and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera), *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera), *Tetranychus atlanticus* Mog (Acarina: Tetranychidae), Adelges joshii S.O

**Figure 18.** *Hyperaspis maindroni* Sicard.

**Figure 19.** *Stethorus gilvifrons* (Mulsant).

**Figure 20.** *Scymnus* (*Scymnus*) *nubilus* Mulsant.

& S (Adelgidae: Homoptera), *Aonidiella auranti* (Mask), *A. citrina* (Coq), *A. orientalis* Newst, *Aspidiotus destructor* Sign, *Hemiberiesia latanias* (Sign), *Leucaspis coniferarum* Hall & Williams, *Parlatoria* spp, *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant, okra, wheat, cotton and rose plants (Ali 2013).

### *Scymnus* (*Pullus*) *latemaculatus* Motschulsky, 1858

Fig. 21

**General distribution.** Pakistan, India, Bangladesh, Sri Lanka, Thailand, Taiwan. (Poorani 2002; Ali 2013).

**Distribution in Sindh.** Tandojam, Hyderabad, and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera), *Amrasca devastans* (Dist), *Amrasca biguttula biguttula* (Ishida) (Cicadellidae: Homoptera); *Bemisia tabaci* (Gennadius) (Aleyrodidae: Homoptera), *Tetranychus atlanticus* Mog (Acarina: Tetranychidae) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant , okra, wheat, cotton, and rose plants (Ali 2013).

**Comment.** Newly recorded from Pakistan.

### *Scymnus* (*Pullus*) *coccivora* Ayyar, 1925

Fig. 22

**General distribution.** India, Pakistan, Bangladesh, Sri Lanka, Malaysia (Poorani 2002).

**Distribution in Sindh.** Tandojam, Hyderabad, and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera), *Tetranychus atlanticus* Mog (Acarina: Tetranychidae) on mustard, lucern, cabbage, cauliflower, potato, turnip, bottle gourd, eggplant, okra, wheat, cotton, and rose plants (Ali 2013).

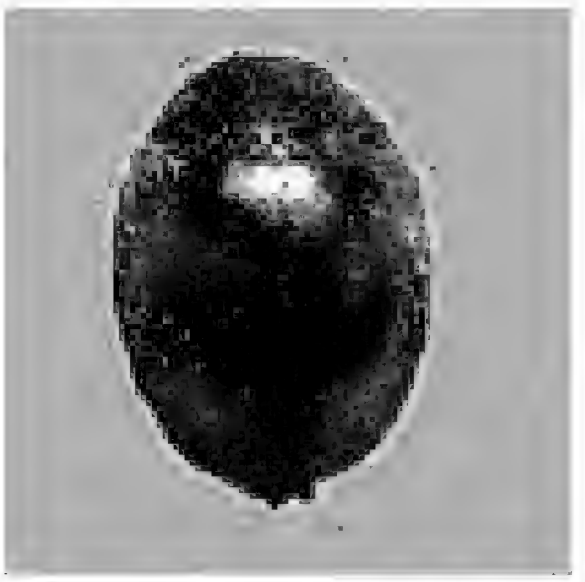

**Figure 21.** *Scymnus* (*Pullus*) *latemaculatus* Motschulsky.

**Figure 22.** *Scymnus* (*Pullus*) *coccivora* Ayyar.

### *Scymnus* (*Pullus*) *castaneus* Sicard, 1929

Fig. 23

**General distribution.** Pakistan, India, Bangladesh (Poorani 2002).

**Distribution in Sindh.** Tandojam, Hyderabad and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green). It was found on eggplant, okra, cotton (Ali 2013).

**Comment.** Newly recorded from Pakistan.

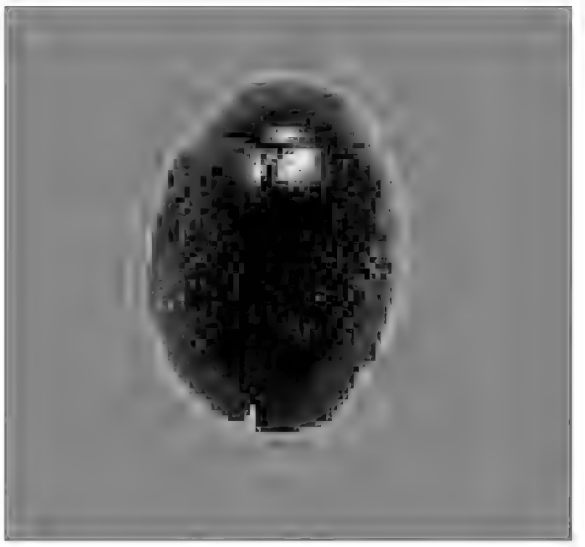

**Figure 23.** *Scymnus* (*Pullus*) *castaneus* Sicard.

### *Scymnus* (*Pullus*) *syriacus* (Marseul, 1868)

Fig. 24

**General distribution.** Iran, Afghanistan, Pakistan (Ali 2013).

**Distribution in Sindh.** Hyderabad and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Brevicoryne brassicae* (L.), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Hysteroneura* setariae (Thomas), *Ropalosiphum maidis* (Fitch), *Therioaphis trifolii* Monell, *Macrosiphum granarium* (Kby), *Schizaphis graminum* (Rondani) (Aphididae: Homoptera) (Ali 2013).

**Comment.** Newly recorded from Pakistan.

### *Nephus regularis* (Sicard, 1929)

Fig. 25

**General distribution.** India, Pakistan, China (Poorani 2002).

**Distribution in Sindh.** Tandojam, Mirpur Khas, Hyderabad and Karachi (Ali 2013).

**Prey and host plant.** *Aphis craccivora* Koch, *A. gossypii* Glover, *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), *Therioaphis trifolii* Monell (Aphididae: Homoptera); *Phenacoccus solenopsis* (Tinsley), *Ferrisia virigata* (Ckll) (Pseudococcidae: Homoptera), *Drosicha mangiferae* (Green) (Margarodidae: Homoptera) on on eggplant, okra and cotton (Ali 2013).

## Tribe Shirozuellini Sasaji, 1967, Genus Ghanius Ahmad, 1973

### *Ghanius karachiensis* Ahmad, 1973

Fig. 26

**General distribution.** Pakistan (Poorani 2002).

**Distribution in Sindh.** Karachi (Ali 2013).

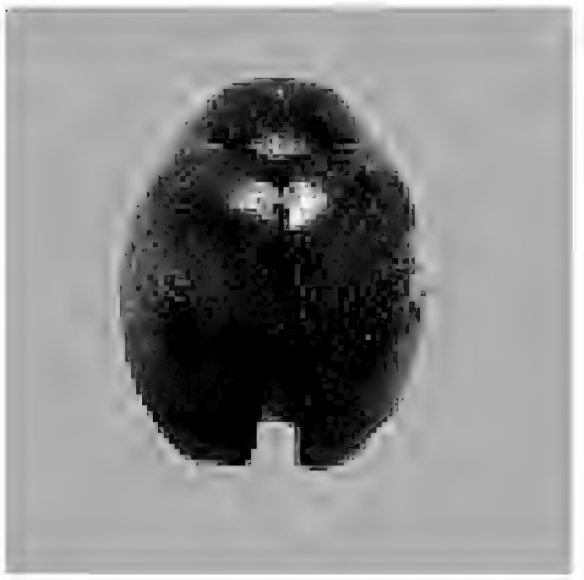

**Figure 24.** *Scymnus* (*Pullus*) *syriacus* (Marseul).

**Figure 25.** *Nephus regularis* (Sicard).

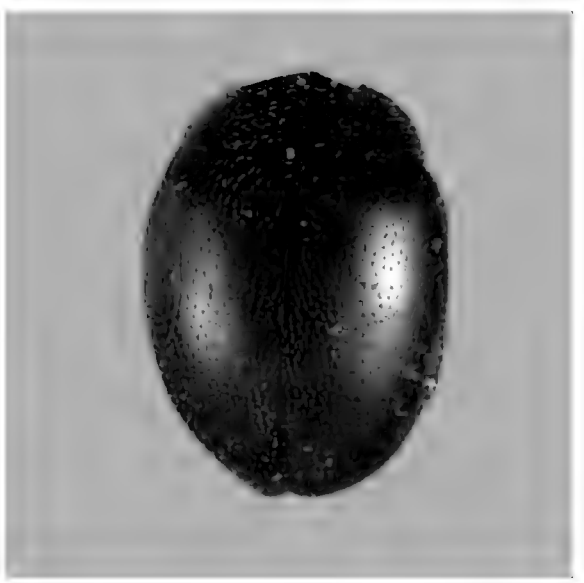

**Figure 26.** *Ghanius karachiensis* Ahmad.

**Host plants and prey species in Sindh.** *Aonidiella auranti* (Mask), *A. citrina* (Coq), *A. orientalis* Newst, *Hemiberiesia latanias* (Sign), *Leucaspis coniferarum* Hall & Williams, *Parlatoria* spp. *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera) (Ali 2013).

### Tribe Sticholotidini Weise, 1901

#### *Pharoscymnus flexibilis* (Mulsant), 1853

Fig. 27

**General distribution.** India, Pakistan, Brazil, and United States (Florida) (Poorani 2002, Thomas and Blanchard 2013).

**Distribution in Sindh.** Tandojam, Mirpur Khas, Hyderabad, and Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Aspidiotus destructor* Sign, *Hemiberiesia latanias* (Sign), *Leucaspis coniferarum* Hall & Williams, *Parlatoria* spp, *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera), *Coccus hesperidium* L, *Siassetia nigra* (Nietn) (Coccidae: Homoptera) on wheat and mustard (Ali 2013).

#### *Pharoscymnus simmondsi* Ahmad, 1970

Fig. 28

**General distribution.** Pakistan, Thailand (Poorani 2002).

**Distribution in Sindh.** Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Parlatoria* spp., *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera), *Coccus hesperidium* L, *Siassetia nigra* (Nietn) (Coccidae: Homoptera) on wheat and mustard (Ali 2013).

#### *Pharoscymnus horni* (Weise), 1900

Fig. 29

**General distribution.** India and Pakistan (Poorani 2002).

**Distribution in Sindh.** Karachi (Ali 2013).

**Host plants and prey species in Sindh.** *Parlatoria* spp. *Pinnaspis strachani* (Cooley), *Quadraspidiotus perniciosus* Comst, *Tecaspis* spp. (Diaspididae: Homoptera), *Coccus hesperidium* L, *Siassetia nigra* (Nietn) (Coccidae: Homoptera) on mustard and wheat (Ali 2013).

## Discussion

Unfortunately, all the specimens were lost during the shifting of Vitoria Museum to National Museum at Karachi. From Pakistan very little taxonomic work has focussed especially on this important family of the order Coleoptera. Irshad (2001) listed 71 species of coccinellids from northern parts of Pakistan. Rafi et al. (2005) listed 37

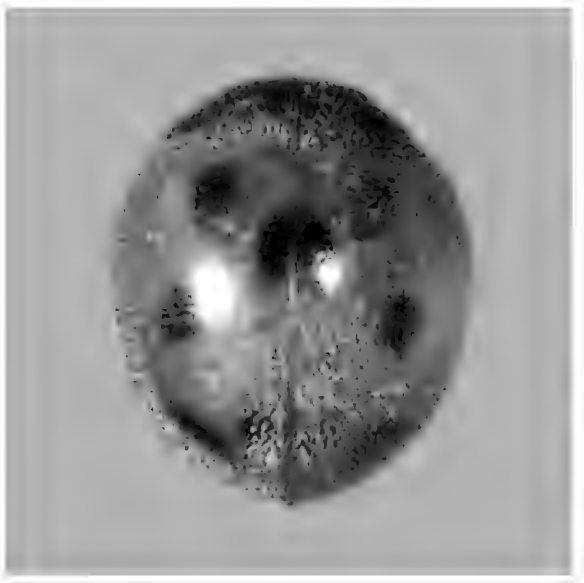

**Figure 27.** *Pharoscymnus flexibilis* (Mulsant).

**Figure 28.** *Pharoscymnus simmondsi* Ahmad.

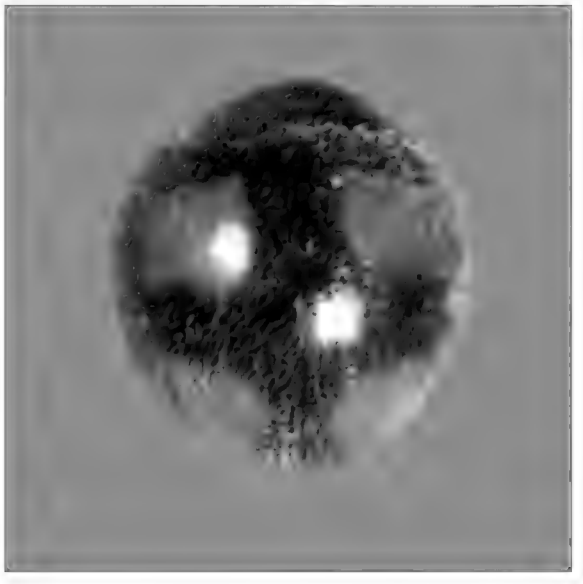

**Figure 29.** *Pharoscymnus horni* (Weise).

genera and 75 species and described the only external morphology of predatory coccinellids mostly collected from northern parts of Pakistan with special reference with their hosts, prey, and localities.

Sindh Province has a rich insect fauna which have diversified into important cities like Karachi, Tandojam, Hyderabad, Larkana, Sukhur, and Mirpur Khas. Coccinellids fauna is still incompletely recorded from Sindh region and has been neglected in the past. All the research findings on coccinellids except Ali (2013) were documentary not taxonomic. No proper collections, identification procedures,or techniques have been used in Sindh to explore the hidden records of insects, including the coccinellid fauna. Ali (2013) worked more comprehensively on the systematics and distribution of ladybirds of Sindh Province with reference to their role in biological control programmes. He tried to highlight the importance of systematic study to make easy their identification as predators of mealybugs, aphids, jassids, whiteflies, and scale insects. This research work may be useful for the entomologists including research students of particularly the Sindh region, but also of Pakistan and other Oriental regions. The geographical distribution and synonyms used in this study for all systematically treated specimens were cited from the findings of Hashmi and Tashfeen (1992).

The present investigation continues the research carried by Ali (2013), and gives a preliminary checklist of ladybirds from Sindh consisting of only one subfamily, ten tribes, 21 genera, and 29 species including four new records: *Bulaea lichatschovii* (Hummel), *Exochomus pubescens* Küster, *Scymnus* (*Pullus*) *latemaculatus* Motschulsky, *Scymnus* (*Pullus*) *syriacus* Marseul and four varieties of *Menochilus sexmaculata* (Fabricius). All these coccinellids from Pakistan are now placed into the subfamily Coccinellinae and the subfamily Microweiseinae according to the recent classification studies. The coccinellid specimens were deposited in the Natural History Museum, Department of Zoology, University of Karachi, Karachi, Pakistan.

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